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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/356,532      | 07/19/1999  | ELLIOT KARL KOLODNER | UK98093             | 7951             |

7590

08/29/2002

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EXAMINER

NGUYEN, DUSTIN

ART UNIT

PAPER NUMBER

2156

DATE MAILED: 08/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |                 |  |
|------------------------------|-----------------|-----------------|--|
| <b>Office Action Summary</b> | Application No. | Applicant(s)    |  |
|                              | 09/356,532      | KOLODNER ET AL. |  |
|                              | Examiner        | Art Unit        |  |
|                              | Dustin Nguyen   | 2156            |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 July 1999.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \*   c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)              | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

1. Claims 1 – 26 are considered for examination.

#### *Drawings*

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show step 4.8 of Figure 4 as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

#### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 6 recites the limitation "a thread heap" in claim 1. There is insufficient antecedent basis for this limitation in the claim. Claim 6 fails to point out whether it is the same or different thread heap from claim 1.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 1-7, 14, 16, 17 and 22-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Kolodner et al. ( US Patent No 6289360 ).

8. As per claim 1, Kolodner discloses the method of managing memory in a multi-threaded processing environment including respective local thread stacks and heaps and a global heap, said method comprising:

creating an object in a thread heap ( e.g. col 1, line 44-46 ); and

monitoring whether the object is reachable from anywhere other than the thread stack ( i.e. connected objects in the heap ) ( e.g. col 2, line 5-8 and line 13-15 ).

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9. As per claim 2, Kolodner teaches

associating a local status with the object ( i.e. Async, Sync1, Sync2 ) ( e.g. col 9, line 28-30 and line 33-36 );

changing the status of the object to global under certain conditions ( i.e. whiteColor and blackColor and color[swept] = blackColor ) ( e.g. col 8, line 50-53 and col 11, line 46-47 ).

10. As per claim 3, Kolodner teaches the method further comprising deleting ( i.e. garbage collect ) from the thread heap one or more local objects when they are not reachable from a local root ( e.g. col 2, line 8-11 ).

11. As per claim 4, Kolodner teaches the reachability is determined by tracing from the local root ( e.g. col 2, line 8-10 ).

12. As per claim 5, Kolodner teaches the status of an object in the thread heap is changed to global if the object is assigned to a static variable ( i.e. whiteColor or blackColor ) or if the object is assigned to a field in a global object ( e.g. col 9, line 56-60 ).

13. As per claim 6, Kolodner teaches the method further comprising intercepting assignment operations to an object in a thread heap to access whether the object status should be changed ( i.e. changed object graph ) ( e.g. col 2, line 19-27 ).

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14. As per claim 7, Kolodner shows the multithreaded processing environment is a virtual machine ( e.g. Figure 2, item 28 ).

15. As per claim 14, Kolodner teaches certain objects are associated with a global status on creation ( e.g. col 8, line 58-65 ).

16. As per claim 16, Kolodner discloses the method further comprising the step of analyzing whether an object is likely to be made global and associated such an object with a global status on creation ( e.g. col 4, line 26-41 ).

17. As per claim 17, Kolodner teaches the method further comprising allocating objects assigned as global on creation to the global heap ( i.e. whiteColor ) ( e.g. col 3, line 59-65 ).

18. As per claims 22-26, they are rejected for similar reasons as stated above. Furthermore, Kolodner discloses the functions and elements above can be performed in a computer program product and computer system.

***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 8, 9, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolodner et al. ( US Patent No 6289360 ) in view of Fresko et al. ( US Patent No 5966702 ).

21. As per claim 8, Kolodner does not disclose the limitation of the claim. Fresko discloses the virtual machine comprises an interpreter ( e.g. col 3, line 7-9 ) and the write operation code in the interpreter is modified to perform the checking of assignment of the object ( i.e. verifier ) ( e.g. col 37, line 7-33 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner and Fresko because linking-time verification enhances the performance of the interpreter ( e.g. Fresko, col 36, line 14-15 ).

22. As per claim 9, Kolodner does not disclose the limitation of the claim. Fresko discloses the virtual machine comprises a just in time compiler ( e.g. col 3, line 10-11 ) wherein native compiled ( e.g. col 3, line 36-40 and Figure 1, item 106 ) write operation code includes native code to perform the checking of assignment of the object ( e.g. col 37, line 53-56 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner and Fresko because linking-time verification enhances the performance of the interpreter ( e.g. Fresko, col 36, line 14-15 ).

23. As per claim 15, Kolodner does not disclose certain objects include class objects. Fresko discloses the above limitation ( e.g. col 16, line 5-9 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner and Fresko because object can be easily and affordably adapted to meet new needs.

24. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolodner et al. ( US Patent No 6289360 ) in view of Fresko et al. ( US Patent No 5966702 ), and further in view of O'Connor et al. ( US Patent No 5953736 ).

25. As per claim 10, Kolodner and Fresko do not disclose the method further comprising using spare capacity in the object header for the flag. O'Connor discloses the above limitation ( e.g. col 13, line 48-52 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner, Fresko and O'Conner because memory space is fully utilized by removing unused objects to save space for new objects.

26. As per claim 11, Kolodner and Fresko do not disclose the limitation of the claim. O'Connor discloses the method further comprising using multiples of 2 or more bytes in a thread heap to store the objects ( e.g. col 13, line 48-52 ) whereby there is at least one spare bit in the object length variable and using the at least one spare bit as the flag ( e.g. col 13, line 60-65 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner, Fresko and O'Conner because memory space is fully utilized by removing unused objects to save space for new objects.

27. As per claim 12, Kolodner does not disclose the limitation of the claim. Fresko discloses the method further comprising moving objects whose status is global from the thread heap to a global heap ( i.e. shared object ) ( i.e. Abstract, line 9-15 ). At the time the invention was made,



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it would have been obvious to a person skill in the art to combine Kolodner, Fresko and O'Conner because memory space is fully utilized by removing unused objects to save space for new objects.

28. As per claim 13, Kolodner and Fresko do not disclose the method further comprising compacting the reachable local objects in a thread heap. O'Connor discloses the above limitation ( e.g. col 2, line 13-18 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner, Fresko and O'Conner because it reduces the complexity inside memory structure.

29. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolodner et al. ( US Patent No 6289360 ) in view of Jagannathan et al. ( US Patent No 5692193 ).

30. As per claim 18, Kolodner discloses the method of managing memory in a multi-threaded processing environment comprising:

creating an object in a thread heap ( e.g. col 1, line 44-46 ); and  
monitoring whether the object is reachable from outside the thread heap ( i.e. thread stack ) ( e.g. col 5, line 19-26 ).

Kolodner does not disclose the multi-thread processing environment including respective local thread stacks and heaps and a global heap. Jagannathan discloses the above limitation ( e.g. Figure 5, items 31, 33, and 35 ). At the time the invention was made, it would have been obvious to a person skill in the art to combine Kolodner and Jagannathan because the

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architecture helps to eliminate the redundancy objects in the local heaps and also memory resources are freed up for other operation purposes.

31. As per claims 19-21, they are rejected for similar reasons as stated above.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dustin Nguyen whose telephone number is (703) 305-5321. The examiner can normally be reached on Monday – Friday (8:00 – 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alvin Oberley can be reached on (703) 305-9716.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directly to the receptionist whose telephone number is (703) 305-3900.

Dustin Nguyen

DN  
08/23/02



**JOHN A. FOLLANSBEE  
PRIMARY EXAMINER**

**Attachment for PTO-948 (Rev. 03/01, or earlier)**  
**6/18/01**

**The below text replaces the pre-printed text under the heading, "Information on How to Effect Drawing Changes," on the back of the PTO-948 (Rev. 03/01, or earlier) form.**

**INFORMATION ON HOW TO EFFECT DRAWING CHANGES**

**1. Correction of Informalities -- 37 CFR 1.85**

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the Notice of Allowability. Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136(a) or (b) for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

**2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.**

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

**Timing of Corrections**

Applicant is required to submit the drawing corrections within the time period set in the attached Office communication. See 37 CFR 1.85(a).

Failure to take corrective action within the set period will result in **ABANDONMENT** of the application.